REMARKS

As requested by the Examiner, the specification is amended at page 1 to indicate the patent number and issue date of the parent application to the Subject Application.

Prior to entry of any amendments, claims 23-54 are pending in the Subject Application. As indicated below, claim 36 is amended herein, claim 41 is cancelled herein, and claims 23-35 and 44-54 have been withdrawn from consideration.

Claim 36 is amended herein to incorporate the equation of claim 41 (i.e., $0.5 \leq (\%Nb + \%Ti + \frac{1}{2}(\%Ta)) \leq 1$), and claim 41 is cancelled. Applicant asserts that the these amendments do not introduce new subject matter into the Subject Application, and therefore request that the Examiner enter these amendments into the record.

Applicant notes the Examiner's indication that the drawings filed on June 24, 2003 have been accepted by the Examiner.

ELECTION

In the Office Action, the Examiner requires election of one of the follow claim sets:

Group I: claims 23, 24, and 44-52;
Group II: claims 25-35, 53 and 54; and
Group III: claims 36-43.

Applicant elects the claims of Group III (i.e., claims 36-43), without traverse, for further prosecution. Accordingly, claims 23-35 and 44-54 have been withdrawn further consideration.

CLAIM OBJECTIONS

At page 5 of the Office Action, the Examiner objects to the wording of claims 36 and 39, indicating that the phrase "at least one of niobium, titanium, and tantalum," is improper group language under MPEP §2173.05(h).

M.P.E.P. §2173.05(h) states that alternative expressions are permitted if they present no uncertainity or ambiguity with respect to the question of scope or clarity of the claims. While M.P.E.P. §2173.05(h) indicates that one acceptable form of alternative expression is the use of a Markush group, neither MPEP §2173.05(h) nor case law

requires the use of such Markush language. Further, as indicated at paragraph II of M.P.E.P. §2173.05(h), the phrase "at least one piece" has been previously held to be acceptable and not in violation of 35 U.S.C §112, second paragraph (*citing* In re Gaubert, 524 F.2d 1222, 187 USPQ 664 (CCPA 1975)).

Applicant submits that claims 36 and 39 as presently written present no uncertainity or ambiguity as to the scope or clarity of the claims. Therefore, Applicant respectfully requests that the Examiner withdraw her objection to these claims. Should the Examiner believe that the language of claims 36 and 39 presents some uncertainty or ambiguity, Applicant requests that the Examiner explain why the Examiner believes the claim language to be indefinite so that the Applicant may appropriately respond to the Examiner's concerns in this regard.

CLAIM REJECTIONS

At page 5 of the Office Action, the Examiner rejects claims 36-43 under 35 U.S.C. §102(b) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being unpatentable over JP 2000-294256 (herein after "Taruya et al.").

More specifically, according the Examiner, Taruya et al. teaches a solid high polymer fuel cell comprising a separator having a specific ferritic stainless steel composition. According to the Examiner, the ferritic stainless steel of Taruya et al. includes 10.5-35 wt.% chromium, 0-6 wt.% molybdenum, not more than 0.018 wt% carbon, not more than 0.2 wt.% titanium and not more than 0.3 wt.% niobium. Further, the Examiner indicates that at paragraph [0020], Taruya et al. discloses the use of a ferritic stainless steel separator in a solid oxide fuel cell, and further teaches at paragraph [0041] that the ferritic stainless steel preferably contains 0.5-5 wt.% molybdenum.

The Examiner also asserts that the claims are unpatentable because, while Taruya et al. is silent regarding the claimed properties, since the compositional limitations are disclosed in Taruya et al., the properties would have been inherent.

In order to better understand the teachings of Taruya et al., Applicant has obtained a certified translation of Taruya et al. and encloses a copy of this translation for the Examiner's reference. All references made hereafter to Taruya et al. are made with reference to the certified translation.

The Examiner indicates that Taruya et al. teaches the use of the referenced ferritic stainless steel separator in a solid-oxide fuel cell; however, Applicant respectfully submits that the disclosure of Taruya et al. is confined to the use of the referenced ferritic stainless steel separator in solid polymer-type fuel cells. That is, throughout the disclosure of Taruya et al. it is indicated that the disclosed invention relates to solid polymer-type fuel cells. For example, in the Abstract of the Disclosure, it states that the problem to be solved is "[t]o provide a solid polymer-type fuel cell with a stainless steel separator..."; at paragraph [0001] it states "[t]his invention is related to solid polymer-type fuel cell..."; and at paragraph [0007], with reference to the figures, it states "Fig. 1 is a drawing showing the construction of a solid polymer-type fuel cell...." (Emphases added).

While somewhat imprecisely at paragraph [0020] Taruya et al. indicates "[t]he problem for this invention is to provide a solid electrolyte-type fuel cell equipped with a stainless steel separator...", at paragraph [0021] it states "[a] summary of this invention is as follows below. (1) A solid polymer-type fuel cell characterized by the separator being composed of ferrite stainless steel...." (Emphasis added).

Accordingly, in reading the disclosure of Taruya et al. as a whole, it is apparent that Taruya et al. discloses and relates to the use of ferritic stainless steel separators in solid polymer-type fuel cells, rather than solid-oxide fuel cells. Therefore, Applicant respectfully submits that Taruya et al. does not anticipate claims 36-43, which are directed to solid-oxide fuel cells.

Further, Applicant submits that Taruya et al. actually teaches away from the use of the disclosed ferritic stainless steel separators in solid-oxide fuel cells. For example, while acknowledging that there are several different types of fuel cells, Taruya et al. indicates that these different types of fuel cells can be distinguished, in part, by their operating conditions. For example, at [0003] Taruya et al. indicates that the rough operating temperature of a solid polymer-type fuel cell is about 80°C, while other fuel cell types have operating temperatures ranging from 200°C to 1000°C.

Taruya et al. further states "[w]ith each of the aforementioned types of fuel cells, in cases when we think about the individual constituent materials of items that are referred to by the common name of 'fuel cell,' it is necessary for them to be batched as

completely different things." Taruya et al. at [0005] (emphasis added). Taruya et al. teaches, for example, "it is not possible to consider the application of materials used in commercialized phosphoric acid-type fuel cells and fused carbonate-type fuel cells in the constituent material of a solid polymer-type fuel cell." Taruya et al. at [0006].

In other words, Taruya et al. teaches that components designed for use in one type of fuel cell cannot be readily incorporated into other types of fuel cells. Accordingly, Applicant submits that one skilled in the art, in considering the disclosure of Taruya et al., would not be motivated to use a ferritic stainless steel separator in a solid-oxide fuel cell. Further, in view of the teachings of Taruya et al., one skilled in the art would have no reasonable expectation of the success of such a combination, since the operating conditions, for example operating temperature, of a solid polymer-type fuel cell are drastically different from that of a solid oxide fuel cell. For example, as taught in Taruya et al., solid polymer-type fuel cells typically operate at temperatures around 80°C, whereas, as disclosed at page 2, lines 15-16 of the Subject Application, solid oxide-type fuel cells operate a high temperatures (1450°F to 1800°F (about 788°C to 982°C)). Therefore, Applicant submits that claims 36-43 would not have been rendered obvious in view of the disclosure of Taruya et al.

Applicant also asserts that Taruya et al. does not disclose or suggest the use of a ferritic stainless steel as set forth in amended claim 36 for use as a separator in any fuel cell type. As indicated above, claim 36 has been amended herein to recite, in pertinent part,

> ...a ferritic stainless steel including
> greater than 25 weight percent chromium,
> 0.75 up to 1.5 weight percent molybdenum,
> up to 0.05 weight percent carbon, and
> at least one of niobium, titanium, and tantalum, wherein
> the weight percentages of niobium, titanium, and tantalum satisfy the equation
> $$0.5 \leq (\%Nb + \%Ti + \tfrac{1}{2}(\%Ta)) \leq 1....$$

At paragraph [0025] Taruya et al. discloses "A solid polymer-type fuel cell ...for which the ferrite stainless steel contains one or two types of Ti and Nb, Ti is less than 0.2% by weight percent and within the range 6(C%+N%) – 25(C%+N%), and Nb is less than 0.3% and with a range of 6C%-25C%." (Emphases added). Taruya et al. further

teaches the reason for the selection of these specific levels of Ti and Nb. At paragraph [0047] Taruya et al. teaches (with emphases added):

> Ti: <u>Ti is less than 0.2% as needed</u>, and is included by a range amount greater than six times and less than 25 times the value of (C%+N%). <u>Ti leads to poisons in the anode and cathode catalytic layer, so it is intrinsically an element that must be reduced</u>, but from the viewpoint of insuring manufacturability during mass production and workability of the plating, the minimum amount is included according to need.

At paragraph [0049], Taruya et al. teaches (with emphases added):

> Nb: Nb is an element that is included as needed, and is also an allying element for which the bonding strength with intra steel C and N is stronger than Cr, the same as Ti. <u>Nb is less than 0.3%,</u> and is included within the range of C% X 6 – C% x 25 [specifically, Nb(%)/C(%) = 6-25%]. It is quite effective in improving tenacity, including normal temperature tenacity of hot rolled coils. <u>However, Nb eluted along with corrosion accumulates as a corrosion product on the corrosion face, and has the harmful effect of raising the contact electrical resistance, so it is more desirable if the Nb content is low</u> from the viewpoint of base material performance. However, the required minimum amount is added in the case of insuring weld performance, or determining the necessity of improving the workability of cold-rolled steel sheet material by simultaneously including Nb and Ti.

Applicant further notes that Taruya et al. <u>does not</u> disclose the addition of Ta to the ferritic stainless steel. Therefore, even if the maximum levels of Ti and Nb disclosed in Taruya et al. were to be incorporated into the ferritic stainless steel, the amount of Ti + Nb would not alone satisfy the equation set forth in amended claim 36 (i.e., $0.5 \leq (\%Nb + \%Ti + \frac{1}{2}(\%Ta)) \leq 1$). In fact, at Table 1 in Taruya et al., the samples containing 0.48 Nb are indicated to be "Comparative Example[s]" rather than "Example[s] of this Invention." Accordingly, Applicant submits that Taruya et al. does not disclose or suggest the alloy composition recited in claim 36.

In order to satisfy the equation set forth in amended claim 36, the levels of Ti and/or Nb would have to be increased beyond levels disclosed in Taruya et al., or Ta would also have to be added to the Taruya et al. alloy. However, as discussed above, Taruya et al. does not teach the use of Ta, and further teaches that it is <u>not desirable</u> to

increase the levels of Ti and Nb in the ferritic stainless steels beyond the specified levels. Thus, Taruya et al. actually teaches away from a ferritic stainless steel as set forth in amended claim 36. Consequently, Applicant asserts one skilled in the art in considering the disclosure of Taruya et al. would not be motivated to formulate a ferritic stainless steel for use as a separator in any type of fuel cell, wherein the ferritic stainless steel included levels of one or more of Ti, Nb, and Ta so as to satisfy the equation set forth in amended claim 36.

Moreover, as discussed above, Taruya et al. indicates that including more than the disclosed levels of Ti and/or Nb is to be avoided due to the fact Ti from the separator can poison the cathode and/or the anode of the fuel cell, and Nb can elute to the surface of the separator causing an increase in contact electrical resistance. Those skilled in the art would appreciate that diffusion of elements such as Ti and Nb from ferritic stainless steel generally increases within increasing temperature. Thus, one skilled in the art would have derived no expectation from Taruya et al. that one could succeed by employing an interconnect formed from a ferritic stainless steel as set forth in claim 36 in a solid oxide fuel cell, which (as indicated above) operates at significantly higher temperatures than the solid polymer-type fuel cells with which Taruya et al. is concerned.

Consequently, Applicant respectfully submits that Taruya et al. neither anticipates nor renders obvious claim 36 or any of the claims that depend therefrom, and requests that the Examiner reconsider and allow the pending claims.

* * * * *

CONCLUSION

Claims 36-40, 42, and 43 are presently under examination in the Subject Application. For the foregoing reasons, Applicant respectfully submits that these claims are in a condition for allowance and requests that the Examiner withdraw her rejections/objections thereto, and allow these claims.

Should the Examiner have any questions regarding any of the foregoing remarks or if the undersigned may be of any assistance to the Examiner in addressing any remaining issues to advance Subject Application to allowance, please contact the Applicant's undersigned representative at the number set forth below.

Respectfully submitted,

Kami Lammon-Hilinski
Registration No. 51,913

KIRKPATRICK & LOCKHART NICHOLSON GRAHAM LLP
Henry W. Oliver Building
535 Smithfield Street
Pittsburgh, PA 15222-2312

Phone: 412.355.8928
Fax: 412.355.6501